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Natural Resource Program Center

Gauley River National Recreation Area and New River Gorge National River and Bluestone National Scenic River Climate of 2008

Natural Resource Data Series NPS/ERMN/NRDS—2010/XXX

ON THE COVER
Mist over Insignificant rapid, Gauley River. Gauley River National Recreation Area
Photograph by: Jim Vanderhorst

Gauley River National Recreation Area and New River Gorge National River and Bluestone National Scenic River Climate of 2008

Natural Resource Data Series NPS/ERMN/NRDS—2010/XXX

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U.S. Department of the Interior
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The National Park Service, Natural Resource Program Center publishes a range of reports that address natural resource topics of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Data Series is intended for timely release of basic data sets and data summaries. Care has been taken to assure accuracy of raw data values, but a thorough analysis and interpretation of the data has not been completed. Consequently, the initial analyses of data in this report are provisional and subject to change.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner. This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

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NPS XXXXXX, February 2010

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List of Key Acronyms

BLUE	Bluestone National Scenic River
COOP	National Weather Service Cooperative Observer Program
CWOP	Citizen Weather Observer Program
FAA	Federal Aviation Administration
GARI	Gauley River National Recreational Area
IFLOWS	Integrated Flood Observing and Warning System
NADP	National Atmospheric Deposition Program
NARR	North American Regional Reanalysis
NCDC	National Climatic Data Center
NERI	New River Gorge National River
NWS	National Weather Service
PDSI	Palmer Drought Severity Index
PRISM	Parameter-elevation Regressions on Independent Slopes Model
RAWS	Remote Automated Weather Stations
USGS	United States Geological Survey

Executive Summary

Weather and Climate for Calendar Year 2008

The winter was seasonably mild (averaging about 2.0°F/1.1°C above normal), however the spring had near normal temperatures in the Southern Climate Division of West Virginia (a warm April and June offset by a very cool May). The summer of 2008 was slightly cooler than average and the autumn also averaged cooler than the long-term mean. As a result, 2008 ranked just below the 114 year mean for annual temperatures and considerably lower than 2007. A near average winter precipitation was followed by a moist spring; a dry summer and a near normal autumn. The wettest periods were during the second week of August and December. The snowiest time was from mid-January to late February, though a heavy wet snow fell in the mountains on November 17th. The most active thunderstorms occurred in mid-June, late July and mid-August. The region felt the indirect effects of tropical storm Hanna on September 6-7. The highest readings for the year occurred in June with values above 90.0°F (32.0°C) and the lowest readings occurred in late January near 1.4°F (-17.0°C).

Climate Indicator Status and Trends

The lengthening of the growing season noted a reversal in 2008 as a late freeze occurred in early May and an early freeze was noted in the middle of October. The trend toward milder winter nights also had a setback in 2008 as an early January and late February cold snap produced several near zero (-17.8°C) nights. Despite near normal annual temperatures, the winter produced an above average number of sub-freezing nights. The summer had a near average number of hot days. A significant increase in autumn rainfall was evident with a very wet December. The fall season has shown the most significant increase in rainfall during the past few decades. Snowfall returned to average values after several mild winters. The Palmer Drought Severity Index (PDSI) during 2008 showed that dry conditions began and ended the year, with October being the driest month. A minimum in solar activity (very few sunspots), which often correlates to slowly dropping mean annual temperatures, continued into 2008 matching the least active period in solar activity since 1913.

Table 1. Summary of 2008 significant climate indicators for the West Virginia Parks. Data from the weather stations at Grandview (GRNW2) and Beckley (BCKW2), WV compared to the 30 year normal from Charleston (KCRW), WV.

Metric	2008 Statistics	Comments on Trends
Average Annual Maximum Temperature	60.9-65.7°F (16.1-18.7°C)	Above the long-term average of 60.9-66.4 °F (16.1-19.1°C)
Average Annual Minimum Temperature	41.3-45.0 °F (5.2-7.2°C)	Near the long-term average of 41.3-44.6°F (5.2°-7.0C)
Hot Days (number of days Tmax≥90.0°F/32.0°C)	0-26 days	Near the 30-year mean of 1-20 days
Cold Days (number of days Tmax<32.0°F/0.0°C)	13-34 days	Just Below the 30-year mean of 20–40 days
Winter Minimums (Lowest Temp)	~1.4°F (-17.0°C)	Above the long-term average of 1.0°F (-17.2°C)
Sub-freezing Nights (number of days Tmin≤32.0°F/0.0°C)	101-117	Above the 30-year mean of 98-111
Cold Winter Nights (number of days Tmin≤0.0°F/-17.8°C)	0	Below the long term average of 1.5-3.6
Growing Season Length: Days between last spring 32.0°F/0.0°C and first fall 32.0°F/0.0°C	172–186 days	Below the 30-year mean of 190 days
Annual Precipitation	42.6–56.2 in (1082-1427 mm)	Near the 30-year mean of 41.6–44.1 in (1057-1120 mm)
Autumn (Oct, Nov, Dec) Precipitation	7.7-10.2 in (196-259 mm)	Near the long-term average of 11.0 in (279 mm)
Number of days ≥ 1.0 in (2.5 cm) rain	6-12 days	Near the 30-year mean of 7 days
Micro-drought (number of strings of 7+ days without rain)	4	Near the long-term average of 4-5 days
Annual Snowfall	25–40 in (64-102 mm)	Below the 30-year mean of 38–59 in (97-150 mm)

Introduction

Weather and climate are widely recognized as key drivers of terrestrial and aquatic ecosystems, affecting biotic as well as abiotic ecosystem characteristics and processes. Global and regional scale climatic patterns, trends, and variations are critical to the cycling of elements, nutrients, and minerals through the ecosystems and can deliver pollutants from regional and even global sources (National Assessment Synthesis Team, 2001). These variations and trends influence the fundamental properties of ecologic systems such as soil-water relationships and plant-soil processes and their disturbance rates and intensity. Information obtained from meteorological monitoring will be useful to interpreting and understanding changes in species composition, community structure, water and soil chemistry, and related landscape processes (Marshall and Piekielek, 2007).

The purpose of this report is to provide a concise climate summary for January 1 to December 31, 2008, and to place current patterns and trends in an appropriate historical, regional, and global context (Knight et al, in preparation). It is our intention that this report will satisfy an inherent interest in meteorological phenomena, and meet the Eastern Rivers and Mountains Network (ERMN) Weather and Climate Monitoring objectives:

- Document long-term trends in weather and climate through seasonal and annual summaries of selected parameters (e.g., multiple forms of precipitation, temperature).
- Identify and document extremes and averages of climatic conditions for common parameters (e.g., precipitation, air temperature), and other parameters where sufficient data are available (e.g., wind speed and direction, solar radiation).
- Provide information on near real-time weather parameters, historical climate patterns, and climate station metadata from a single, easy to use Internet portal.

To accomplish these objectives, a variety of atmospheric data streams were evaluated for their quality, longevity, and applicability to the ERMN parks. Since no single network contains all the pertinent measures of atmospheric phenomena to assess ecosystem health, an objective analysis of the data networks was developed and outlined in the Weather and Climate Monitoring Protocol for the Eastern Rivers and Mountains and Mid-Atlantic Networks of the National Park Service (Knight et al, in preparation). Through this analysis, a select number of weather/climate stations were chosen as representative of each park and these are the primary data sources used in the profile of last year's climate summary and trends.

In addition to a suite of summary tables, graphs, and narratives, we specifically identify a series of key climatological indicators to report status and trends on an annual basis and periodically in separate and more thorough reports. These key indicators are further described in the protocol (Knight et al, in preparation) and summarized in the body of the text.

Climate of the Central and Southern West Virginia Region

GARI lies in West Virginia Climate Division 4 "Central", while BLUE lies within the WV "Southern" Climate Division (5). NERI lies in the West Virginia Climate Divisions 4 and 5. These divisions are generally considered to have a humid continental type of climate, but the varied physiographic features have a marked effect on the weather and climate of the various parts of this region. The prevailing westerly winds carry most of the weather disturbances that affect the region from the interior of the continent, with the Atlantic Ocean having only an occasional influence on the climate of the area (Gawtry and Stenger, 2007). Coastal storms do, at times, affect the day-to-day weather, especially in the winter. Infrequently, storms of tropical origin can have a significant effect causing severe floods in some instances.

Temperatures are moderately continental with the tempering effects of the Great Lakes contributing to cloud production in the winter and mountain-valley circulation clouds reducing the heat at times during the summer. The lowest readings in the winter occur with polar air masses of Canadian origin settling over the region after a fresh snowfall. The highest readings of the summer happen when the sub-tropical fair weather system, the Bermuda high, pushes westward into the Carolinas. Its clockwise circulation will direct hot, humid air from the Gulf region into the Ohio Valley and West Virginia. The humid southwest winds ascending the crest of the Appalachians can produce widespread afternoon thunderstorms. On average, Gauley River NRA tends to have a greater number of hot days (temperatures above or equal to 90.0°F/32.0°C) than New River Gorge NR and Bluestone NSR. The last freeze typically occurs in mid-May and the first frosts appear in October.

Precipitation is fairly evenly distributed throughout the year. Annual amounts generally range between 36 to 52 in (914 to 1321 mm), while the majority of places receive 38 to 44 in (965 to 1118 mm). Greatest amounts usually occur in the late spring and summer months, while February is the driest month, having about 2 in (51 mm) less than the wettest months. Precipitation is somewhat greater in the mountains due to upslope flow from the Great Lakes which frequents the area in the cold season. During the warm season, the uneven heating over the irregular terrain leads to numerous thunderstorms which typically form over the mountains.

Surface winds blow from the west and northwest in the cold season and from the southwest during the warm half of the year. Thunderstorms follow a frequency that matches the solar cycle, occurring between the equinoxes and reaching a peak near the solstice. Hail is relatively infrequent, but flash floods and damaging thunderstorm winds affect parts of the region each summer. On average, tornadoes pass through the area about once every three years. The direct effects of an Atlantic hurricane are uncommon, though remnant rains from hurricanes and tropical storms have contributed to the region's worst floods. Ice storms, which can cause significant disruption, occur at irregular intervals but are primarily confined to the months between December and March (Kocin and Uccellini, 2004).

Observing Sites

A total of 27 weather observing sites comprising five data networks were selected around GARI, NERI and BLUE (Figure 1). Representative stations within a 100 km range of each park were chosen based on several criteria which include proximity to the park, the representativeness of the station to the park elevation profile, the type and frequency of observations, the period of record of the data, and data availability (Knight et al,. in preparation). A subset of these observing networks (IFLOWS, GOES, NADP, and CWOP; 3 total observing sites) are not yet utilized for these reports due to limited data availability and/or lack of data quality assurance (Bureau of Land Management, 1997). Moreover, the percentage of time an observing station reports a particular parameters (e.g., temperature) can influence data inclusion. A total of 19 observing sites were ultimately used for this 2008 report (Table 2).

In addition to the summary information available in this report, a near real-time data stream has been made available to the ERMN through a web interface for the selected observing stations along with monthly, seasonal and annual summaries. The web interface is accessible through the following link:

http://climate.met.psu.edu/gmaps/NPS_DEVELOPMENT/interface.php

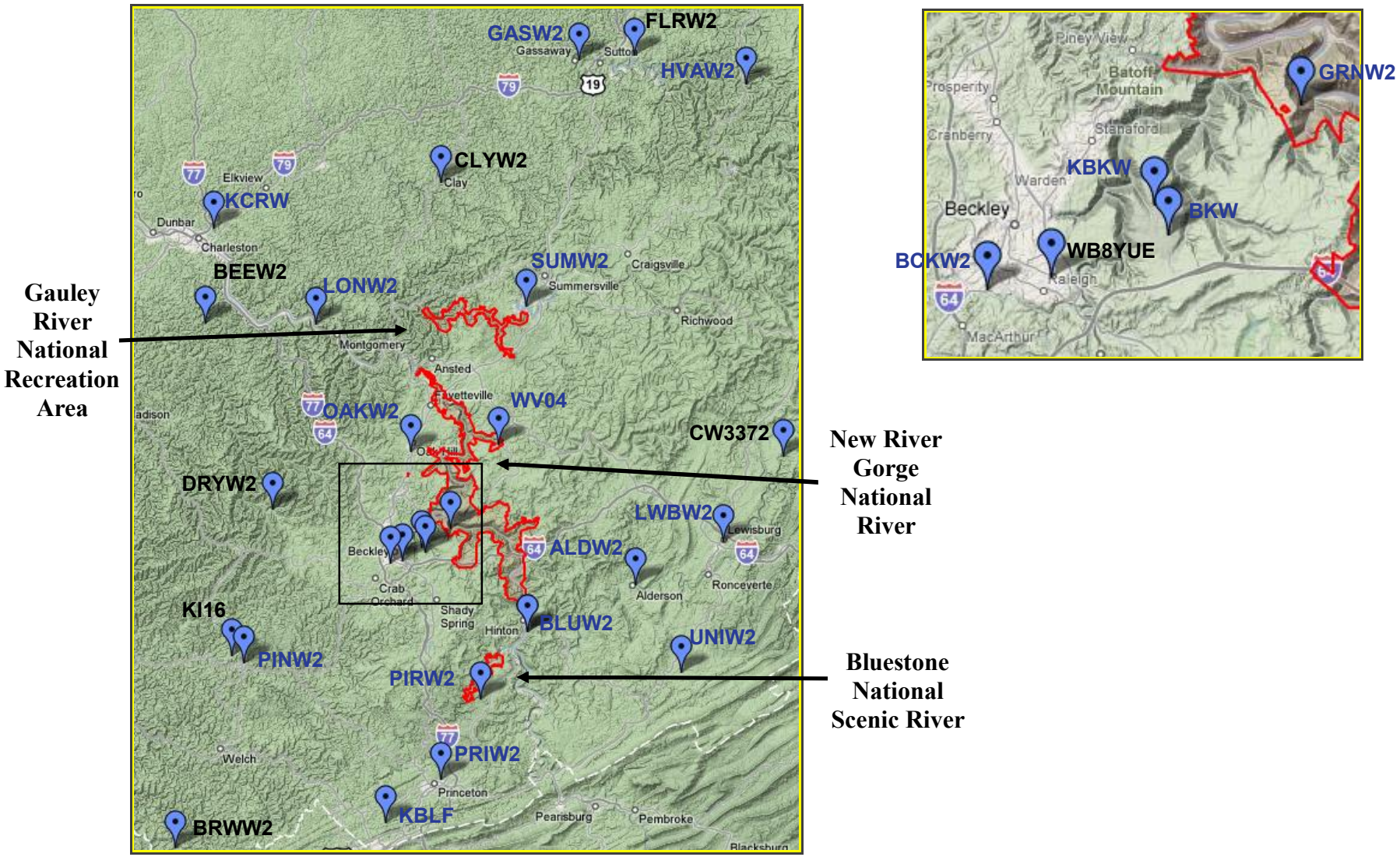

Figure 1. Location of observing sites around Gauley River National Recreation Area, New River Gorge National River, and Bluestone National Scenic River.

Table 2. List of 24 weather/climate reporting sites around GARI, NERI, and BLUE. Those in bold (19) have been selected as best representative of the parks in 2008, in large part due to the percent time of reporting during 2008. Not all data networks are shown here – missing are: IFLOWS, GOES, NADP, and CWOP because their data is either incomplete or not quality assured.

Stations	Network	Name	Period of Record (POR)		Percentage of Time Reporting Temperature for 2008	Percentage of Time Reporting Precipitation for 2008	Percentage of Time Reporting Temperature for entire POR	Percentage of Time Reporting Precipitation for entire POR
ALDW2	COOP	Alderson	08/01/1948	Present	**100.0**	**100.0**	37.1	94.7
BCKW2	COOP	Beckley	08/01/1948	Present	**100.0**	**100.0**	95.0	95.4
BLUW2	COOP	Bluestone Lake	03/01/1943	Present	**-**	**100.0**	89.8	92.6
DRYW2	COOP	Dry Creek	12/01/1961	Present	83.6	83.7	17.6	98.2
LWBW2	COOP	Lewisburg	04/01/1987	Present	**100.0**	**100.0**	99.2	99.0
OAKW2	COOP	Oak Hill	08/01/1948	Present	**100.0**	**98.4**	98.5	98.6
UNIW2	COOP	Union 3 SSE	04/01/1978	Present	**-**	**100.0**	93.9	99.1
CLYW2	COOP	Clay 1	01/01/1948	Present	32.2	34.2	9.9	56.1
GASW2	COOP	Gassaway	05/01/1951	Present	**100.0**	**99.2**	98.2	98.3
HVAW2	COOP	Hacker Valley	08/01/1960	Present	**100.0**	**100.0**	19.0	96.1
LONW2	COOP	London Locks	08/01/1948	Present	**96.7**	**96.4**	97.5	97.8
SUMW2	COOP	Summersville Lake	07/01/1966	Present	**92.1**	**95.4**	63.6	64.5
PINW2	COOP	Pineville	08/01/1948	Present	**94.8**	**94.8**	98.7	99.1
PRIW2	COOP	Princeton	08/01/1948	Present	**-**	**98.1**	8.4	99.2
BKW	COOP	Beckley	05/14/1963	Present	100.0	100.0	99.9	99.8
KBLF	FAA	Bluefield	01/01/1973	Present	99.5	58.2	99.2	14.2
KCRW	FAA	Charleston	02/05/1949	Present	**99.5**	**99.5**	21.2	21.2
KBKW	FAA	Beckley	01/01/1973	Present	**99.5**	**99.5**	98.4	98.4
KI16	FAA	Pineville	01/01/2004	Present	95.9	-	86.5	-
PIRW2	RAWS	Pipestem	06/09/2005	Present	**98.9**	**98.9**	88.2	88.2
BRWW2	RAWS	Berwind	09/14/2005	Present	77.6	77.6	75.8	75.8
FLRW2	RAWS	Flatwoods	06/09/2005	Present	**98.9**	**98.9**	88.6	88.6
GRNW2	RAWS	Grandview	01/01/2005	Present	**98.9**	**98.9**	99.4	99.4
BEEW2	RAWS	Bee Mountain	09/14/2005	Present	**98.9**	**98.9**	81.8	81.8

Calendar Year 2008 Temperature Summary

The year averaged above the long-term mean for temperature, though not as warm as earlier years in this decade. After a cool January, the next three months of 2008 were milder than usual with April exhibiting the largest departures (Figures 2 and 3). Several cold episodes brought morning readings near 0°F (-17.8°C) during January and February and the lowest values in many sections were measured around January 25-26, 2008. 1.4°F (-17.0°C) was the lowest reading for the year near the parks, which occurred in Beckley, WV on January 25th (Table 3). The number of days with sub-freezing nights was above the long term mean (Tables 3 and 4).

The spring had alternating warmth and chill with the period April-May-June averaging very close to the long-term mean values (Tables 5 and 6). An outbreak of unseasonably cold weather at the start of May brought most sections a late freeze and frost (between May 1-2) so the growing season in parts of each park began later than in recent years. The highest readings of the year came early when temperatures rose well into the 80's to near 90°F (32°C) between June 7 and June 10. This warm period ended with heavy thunderstorms, some producing hail in mid-June.

The summer period was cooler than average due to lower than normal maximum readings. No record maximums were recorded during the July-August period and the highest reading for the year was below the long-term value. A very warm spell occurred from July 18-22 and again from September 1-6 preceding tropical storm Hannah. Regular rainfall led to very few dry spells, though the latter part of August turned quite dry.

The autumn was noticeably cooler than average (Tables 5 and 6). Frosts and freezes occurred earlier than in recent years with most sections noticing sub-freezing readings [<32°F (<0°C)] between October 21-24. As a result, the length of the growing season was shorter (by about two weeks) than in other years this decade. Maximum temperatures during November were well below normal and the departures were the largest for any month. For example, the monthly average temperature in Beckley, WV for November was 36.2°F (2.3°C), which was 4.6°F (2.6°C) below normal (Tables 7 and 8). December brought milder weather with alternating cold and warm spells. A cold snap early in the month did bring some minimums near 0.0°F (-17.8°C).

Overall, despite the cooling trend in annual air temperatures compared with the rest of this decade, the soil temperatures continue to show a slow warming in response to the long-term warming of the lower atmosphere (Figure 5). The total growing season length (days between last spring freeze and first fall freeze) ranged from 172-186 days in 2008.

Gauley River NRA, Bluestone NSR, New River Gorge NR
Departure from Average Monthly Maximum Temperature
2008 vs. 1971–2000

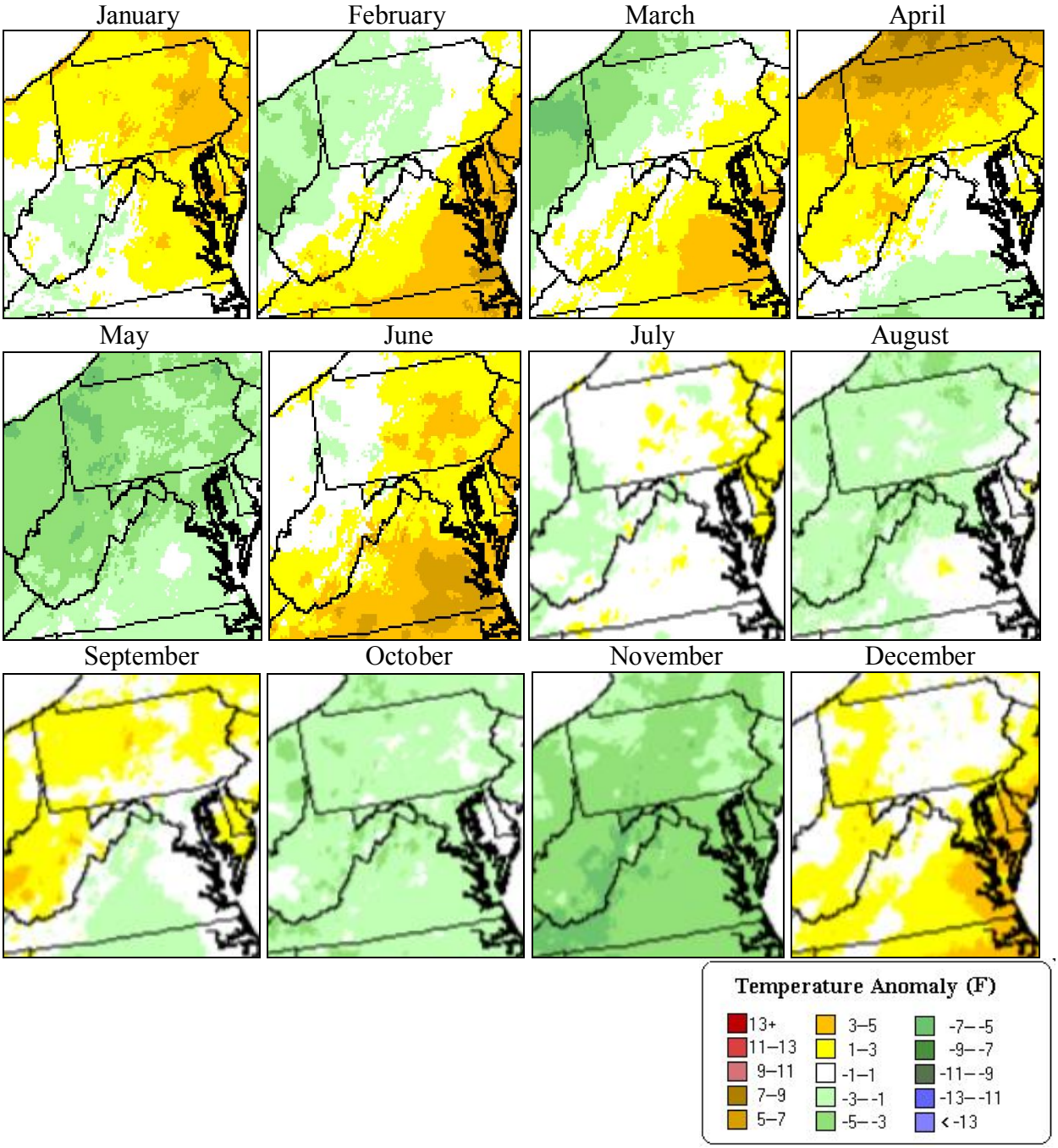

Figure 2. Map showing departures from average maximum daily temperatures (°F) for each month in the calendar year 2008 as compared with the normal based on the period 1971–2000. Maps were created using estimates from the Parameter-elevation Regressions on Independent Slopes Model (PRISM). PRISM uses an interpolation scheme for temperature between actual observations and corrects these estimates for changes in topography across the region (Daly et al, 2002). More information can be found at http://www.prism.oregonstate.edu/.

Gauley River NRA, Bluestone NSR, New River Gorge NR
Departure from Average Monthly Minimum Temperature
2008 vs. 1971–2000

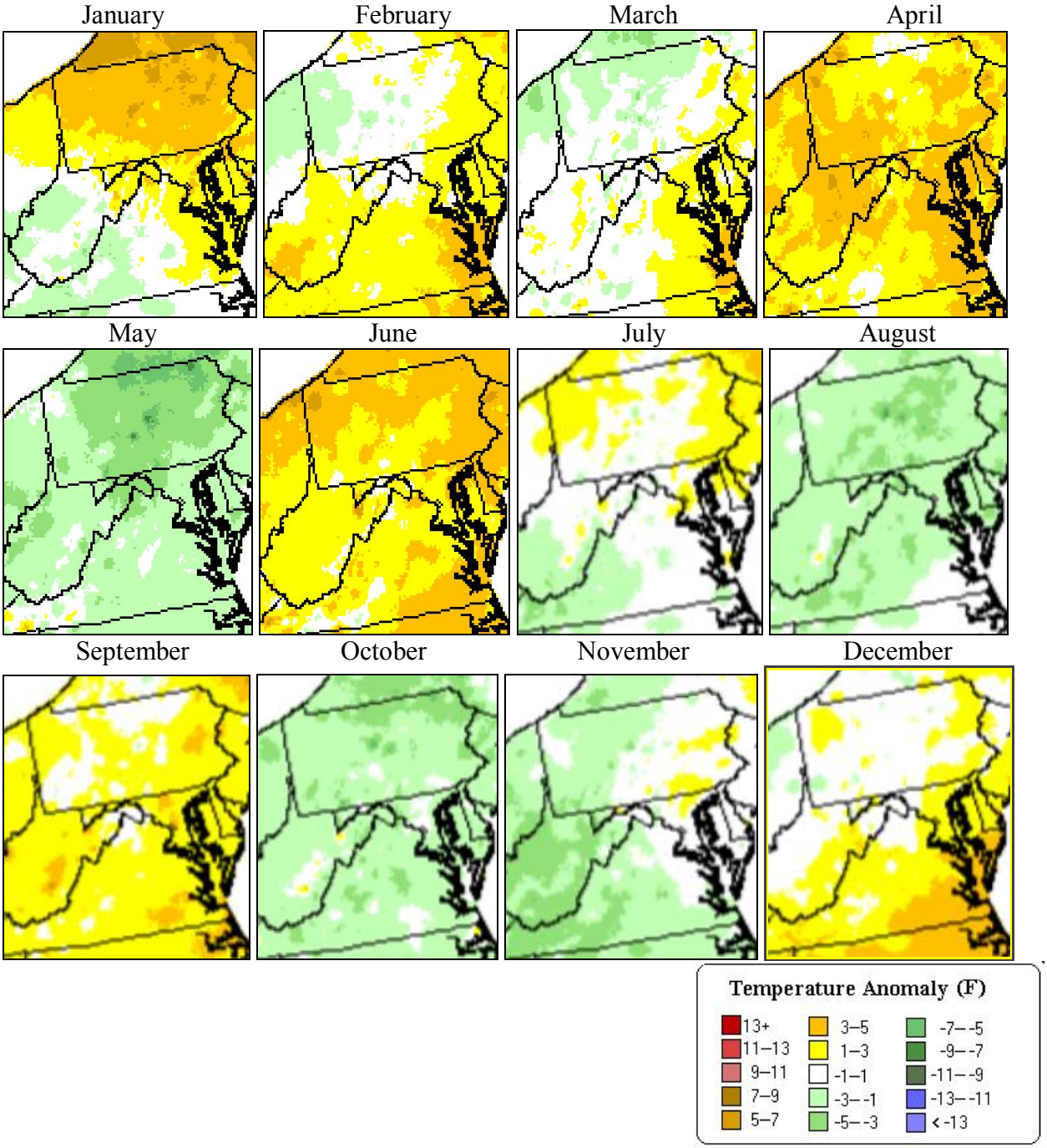

Figure 3. Map showing departures average minimum daily temperatures (°F) for each month in the calendar year 2008 as compared with the normal based on the period 1971–2000. Maps were created using estimates from the Parameter-elevation Regressions on Independent Slopes Model (PRISM). PRISM uses an interpolation scheme for temperature between actual observations and corrects these estimates for changes in topography across the region (Daly et al, 2002). More information can be found at http://www.prism.oregonstate.edu/.

Table 3. Temperature indicators of the climate near the West Virginia parks using a FAA site at Beckley, WV and a COOP site at Grandview, WV and comparing their 2008 data with the 30 year means from Beckley, WV. The trend in 2008 showed an increase in sub-freezing nights and a marginal increase in the frequency of cold winter days. The length of the growing season was shorter than the 30-year average.

2008 statistics compared with 30-year means	Grandview, WV (GRNW2) 2008	Beckley,WV (KBKW) 2008	Beckley, WV (KBKW) 1971–2000
Average Annual Maximum Temperature	61.0°F (16.1°C)	60.9°F (16.1°C)	60.9°F (16.1°C)
Average Annual Minimum Temperature	41.9°F (5.5°C)	41.3°F (5.2°C)	41.8°F (5.4°C)
Cold Days (number of days with Tmax ≤32°F/0°C)	25	34	26.6
Sub-freezing Nights (number of days with Tmin ≤32°F/0°C)	112	117	110.7
Winter Minimums (Lowest Temp)	2.0°F (-16.7°C)	1.4°F (-17.0°C)	-22.0°F (-30.0°C)
Cold Winter Nights (number of days with Tmin ≤0°F/-17.8°C)	0	0	3.6
Hot Days (number of days with Tmax ≥90°F/32°C)	1	0	1.0
Growing Season Length: Days between last spring 32°F/0°C and first fall 32°F/0°C	172	172	190

Table 4. Temperature indicators of the climate near the West Virginia parks using the FAA site at Charleston, WV and comparing its 2008 data with 30 year normals. While its elevation is lower than the parks, the trend in 2008 showed an increase in the frequency of sub-freezing nights. The summer of 2008 brought greater than average number of hot days and the length of the growing season was slightly shorter than the 30-year average.

2008 statistics compared with 30-year means	Charleston,WV (KCRW) 2008	Charleston, WV (KCRW) 1971–2000
Average Annual Maximum Temperature	66.4°F (19.1°C)	65.9°F (18.8°C)
Average Annual Minimum Temperature	45.0°F (7.2°C)	44.6°F (7.0°C)
Cold Days (number of days with Tmax ≤32°F/0°C)	13	17.4
Sub-freezing Nights (number of days with Tmin ≤32°F/0°C)	101	98
Winter Minimums (Lowest Temp)	6.0°F (-14.4°C)	-16.0°F (-26.7°C)
Cold Winter Nights (number of days with Tmin ≤0°F/-17.8°C)	0	1.5
Hot Days (number of days with Tmax ≥90°F/32°C)	26	20
Growing Season Length: Days between last spring 32°F/0°C and first fall 32°F/0°C	186	190

Tables 5 and 6. Using aggregated data from more than a dozen COOP stations in proximity (within 100 km of the parks) known as WV Climate Division 4 and 5, the values show a steady decrease from mild in the winter to a rather cool autumn. The summer was one of the driest in the past few decades especially in the southwest division.

Climate Division Rankings Central West Virginia	Jan-Feb-Mar WINTER	Apr-May-Jun SPRING	Jul-Aug-Sep SUMMER	Oct-Nov-Dec AUTUMN
Temperature-2008	46	41	80	73
Precipitation-2008	37	12	89	53
	1 = Warmest or Wettest			114 = Coldest or Driest

Climate Division Rankings Southern West Virginia	Jan-Feb-Mar WINTER	Apr-May-Jun SPRING	Jul-Aug-Sep SUMMER	Oct-Nov-Dec AUTUMN
Temperature-2008	46	57	85	87
Precipitation-2008	68	44	69	60
	1 = Warmest or Wettest			114 = Coldest or Driest

Table 7. Summary of monthly average temperatures for 2008 for the reporting sites around the West Virginia Parks.

Station Location	ID	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Pineville, WV	PINW2	31.0°F	38.0°F	42.5°F	54.7°F	60.3°F	71.2°F	72.1°F	71.3d°F	68.5°F	52.7°F	40.2°F	36.1°F	53.2°F
		-0.6°C	3.1°C	5.8°C	12.6°C	15.7°C	21.8°C	22.6°C	21.8d°C	20.3°C	11.5°C	4.6°C	2.3°C	11.8°C
Alderson, WV	ALDW2	31.0°F	36.8°F	43.0°F	54.7°F	58.5°F	71.1°F	71.7°F	69.8°F	68.2°F	52.5°F	39.8°F	36.5°F	52.8°F
		-0.6°C	2.7°C	6.1°C	12.6°C	14.7°C	21.7°C	22.1°C	21.0C	20.1°C	11.4°C	4.4°C	2.5°C	11.6°C
London Locks, WV	LONW2	33.35°F	38.0d°F	45.2°F	57.2°F	60.1°F	73.6°F	74.5°F	73.1°F	71.4°F	56.4°F	43.6°F	38.6°F	55.3°F
		0.75°C	3.3d°C	7.3°C	14.0°C	15.6°C	23.1°C	23.6°C	22.9°C	21.9°C	13.6°C	6.5°C	3.6°C	12.9°C
Gassaway, WV	GASW2	31.0°F	35.3°F	42.9°F	56.0°F	59.3°F	71.1°F	72.3°F	70.9°F	69.1°F	53.3°F	40.9°F	35.8°F	53.2°F
		-0.56°C	1.8°C	6.1°C	13.3°C	15.1°C	21.7°C	22.4°C	21.6°C	20.6°C	11.8°C	5.0°C	2.1°C	11.8°C
Hacker Valley, WV	HVAW2	29.4°F	34.6°F	41.6°F	53.6°F	55.6°F	68.1°F	68.7°F	67.4°F	66.0°F	49.9°F	38.3°F	35.8°F	50.8°F
		-1.5°C	1.5°C	5.4°C	12.0°C	13.1°C	20.1°C	20.4°C	19.7°C	18.9°C	10.0°C	3.5°C	2.1°C	10.4°C
Beckley, WV	BCKW2	27.5°F	34.4°F	39.5°F	50.3°F	54.7°F	66.1°F	66.1°F	64.1°F	62.6°F	48.0°F	36.2°F	33.8°F	48.6°F
		-2.5°C	1.3°C	4.2°C	10.2°C	12.6°C	19.0°C	18.9°C	17.8°C	17.0°C	8.9°C	2.3°C	1.0°C	9.2°C
Lewisburg, WV	LWBW2	27.6°F	33.3°F	40.9°F	51.5°F	56.2°F	68.5°F	69.0°F	66.1°F	64.0°F	49.0°F	37.2°F	33.5°F	49.7°F
		-2.5°C	0.8°C	4.9°C	10.8°C	13.5°C	20.3°C	20.6°C	18.9°C	17.8°C	9.4°C	2.9°C	0.8°C	9.9°C
Oak Hill, WV	OAKW2	30.6°F	35.6°F	42.3°F	53.1°F	57.5°F	69.5°F	69.3°F	67.7°F	65.9°F	51.9°F	40.6°F	36.2°F	51.7°F
		-0.8°C	2.0°C	5.7°C	11.7°C	14.2°C	20.8°C	20.7°C	19.8°C	18.8°C	11.0°C	4.8°C	2.4°C	10.9°C

a = 1 day missing b = 2 days missing c = 3 days missing d = 4 days missing
Monthly statistics not reported if more than 4 days are missing.

Table 8. Summary of 2008 departure from normal temperature based on 30-year normal (1971–2000) for the reporting sites around the West Virginia Parks.

Station Location	ID	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Pineville, WV	PINW2	-1.1°F	2.1°F	0.4°F	1.6°F	-1.9°F	1.1°F	-2.0°F	-1.7°F	2.1°F	-1.8°F	-4.4°F	0.3°F
		-0.6°C	1.2°C	0.2°C	0.9°C	-1.1°C	0.6°C	-1.1°C	-0.9°C	1.2°C	-1.0°C	-2.5°C	0.2°C
London Locks, WV	LONW2	-0.6°F	1.1°F	0.2°F	3.2°F	-2.9°F	2.3°F	-1.2°F	-1.6°F	2.9°F	-0.7°F	-3.4°F	0.5°F
		-0.3°C	0.6°C	0.1°C	1.8°C	-1.6°C	1.3°C	-0.7°C	-0.9°C	1.6°C	-0.4°C	-1.9°C	0.3°C
Gassaway, WV	GASW2	-0.1°F	0.8°F	0.2°F	3.3°F	-3.1°F	0.9°F	-2.2°F	-2.1°F	2.5°F	-1.7°F	-4.0°F	0.2°F
		-0.1°C	0.4°C	0.1°C	1.8°C	-1.7°C	0.5°C	-1.2°C	-1.2°C	1.4°C	-0.9°C	-2.2°C	0.1°C
Beckley, WV	BCKW2	-1.0°F	2.9°F	0.1°F	1.7°F	-3.0°F	1.7°F	-2.0°F	-2.7°F	2.0°F	-1.9°F	-4.6°F	1.1°F
		-0.5°C	1.6°C	0.1°C	1.0°C	-1.7°C	1.0°C	-1.1°C	-1.5°C	1.1°C	-1.0°C	-2.6°C	0.6°C
Lewisburg, WV	LWBW2	-1.2°F	1.2°F	0.7°F	2.1°F	-2.7°F	2.1°F	-1.4°F	-2.9°F	1.4°F	-2.4°F	-3.9°F	0.9°F
		-0.7°C	0.7°C	0.4°C	1.2°C	-1.5°C	1.2 °C	-0.8°C	-1.6°C	0.8°C	-1.3°C	-2.2°C	0.5°C
Oak Hill, WV	OAKW2	-0.1°F	1.8°F	0.4°F	1.8°F	-2.1°F	2.3°F	-1.8°F	-2.3°F	2.2°F	-0.9°F	-3.1°F	1.6°F
		-0.1°C	1.0°C	0.2°C	1.0°C	-1.2°C	1.3°C	-1.0°C	-1.3°C	1.2°C	-0.5°C	-1.7°C	0.9°C

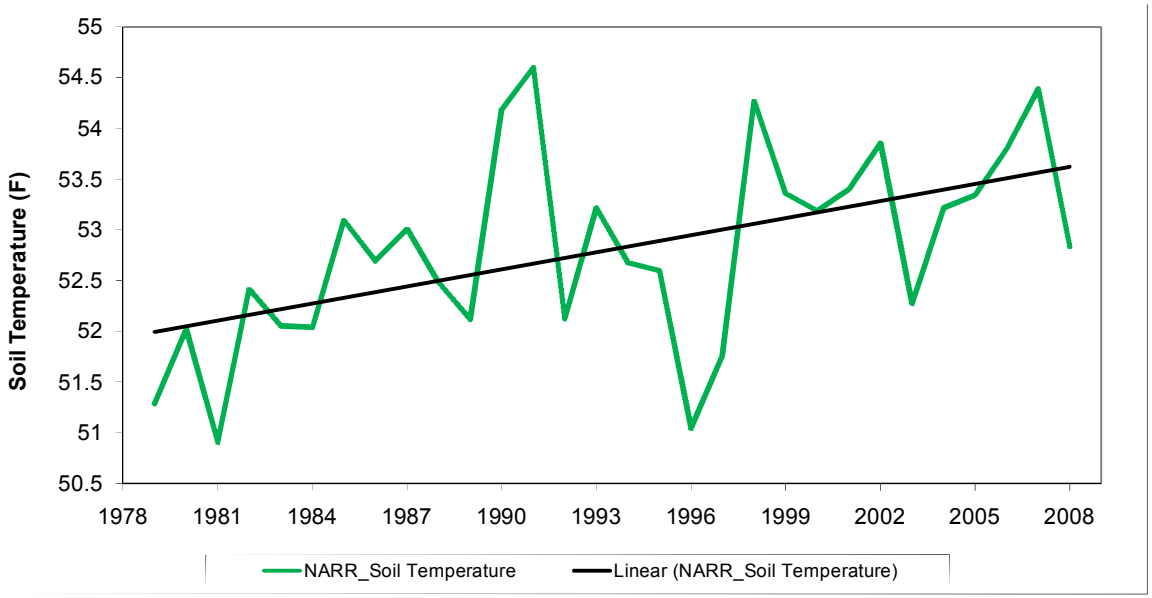

Figure 4. Annual soil temperature trends for BLUE/GARI/NERI as seen from the North American Regional Reanalysis data set. The black line is the soil temperature trend for a 32-km square box centered near the parks as derived from the North American Regional Reanalysis (NARR). The steady rise is consistent with the warming trend noted in the atmospheric during the past 30 years, though the effects of a cooler year are also evident.

Growing Degree Days

The derived quantity, growing degree days – base 55°F/12.8°C, is shown for its accumulation and long-term trend during several important intervals of the annual growing season. The accumulation of growing degree days is directly related to the phenological cycle of the flora and fauna and its related pests and diseases. Trends in the growing degree days can signal changes in the exposure of the region's fauna to native and invasive pests. For the Gauley River National Recreation Area, New River Gorge National River, and Bluestone National Scenic River, a steady increase is noted in all periods with the most pronounced warming during the early spring (Figures 5, 6, and 7).

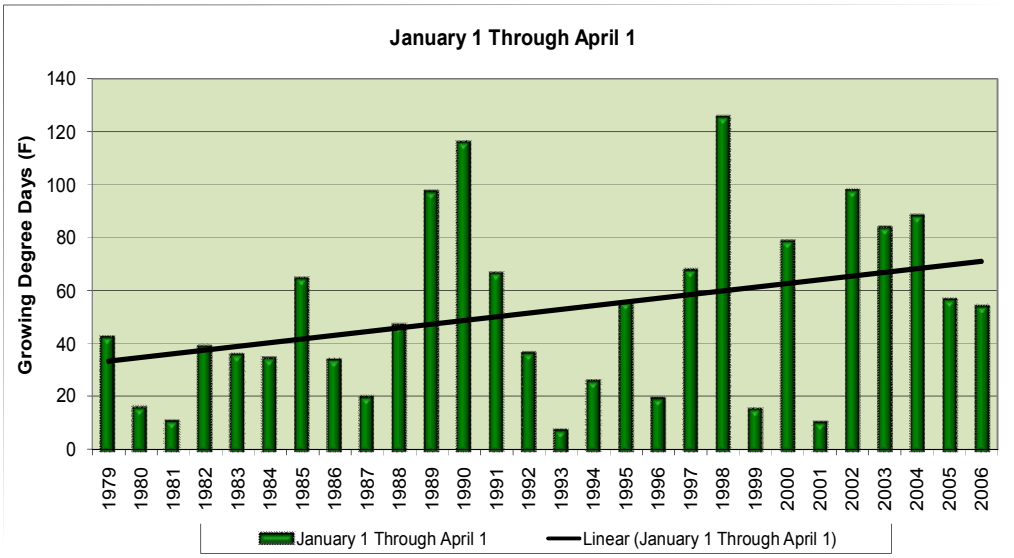

Figure 5: The accumulation of growing degree days for the BLUE/GARI/NERI cooperative reporting stations based on a 90 day period from January 1 to April 1 each year. There is a noteworthy increase showing a progressively earlier start to the growing season.

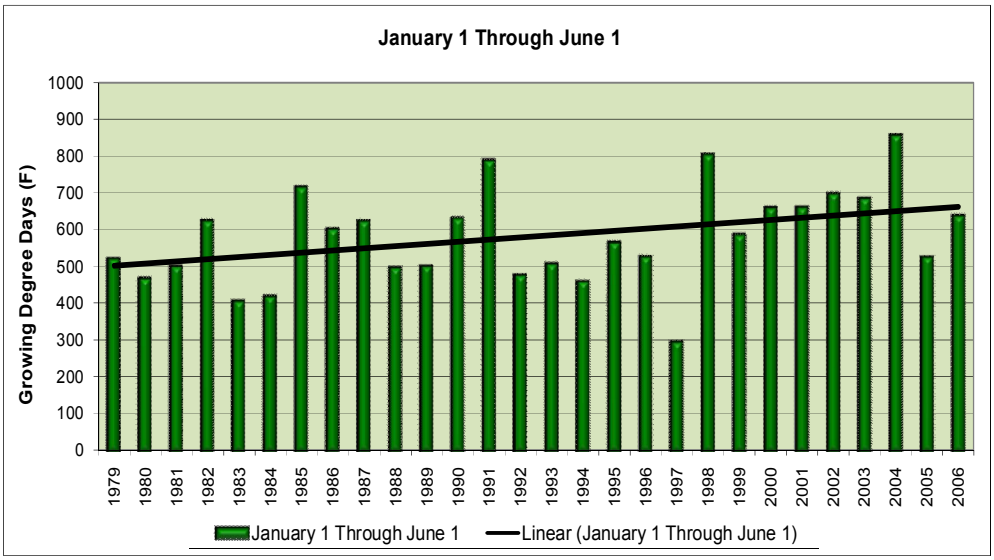

Figure 6: The accumulation of growing degree days for the BLUE/GARI/NERI cooperative reporting stations based on a 150 day period from January 1 to June 1 each year. There is rising trend during the last 30 years with an increase of approximately 20%.

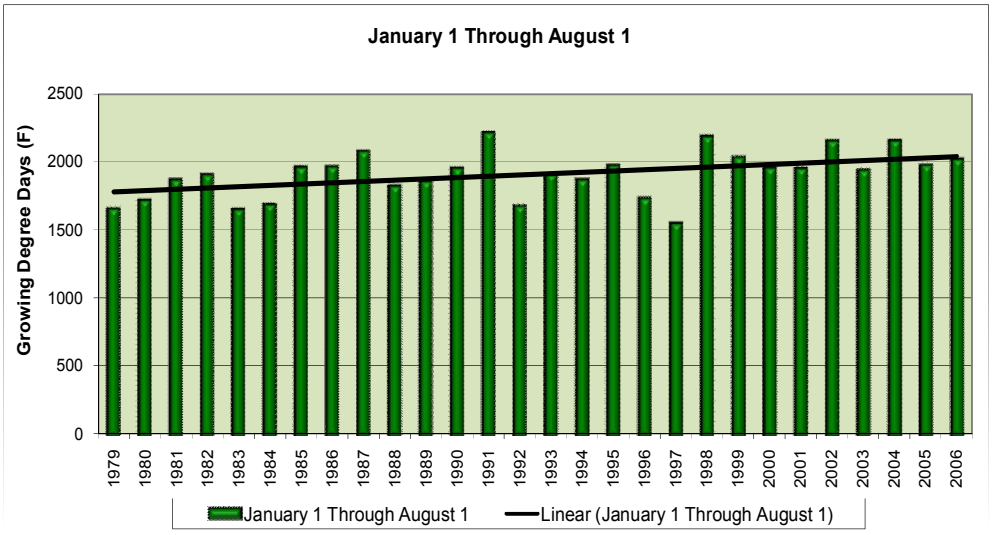

Figure 7: The accumulation of growing degree days for the BLUE/GARI/NERI cooperative reporting stations based on the majority of the growing season (215 days). There is an increase, approximately 15% during the last 30 years.

Calendar Year 2008 Precipitation Summary

For six of the last seven years, annual precipitation for the region averaged above the long-term mean. The wettest day of the year occurred on August 14th with 3.8 inches (97 mm) (Table 9). Dry spells were noted in August and September, which is typical, but also in November. Snowfall was well below normal due to a persistent wintertime storm track into the Great Lakes which frequently brought mild, moist air into the region. The number of days with excessive rainfall (>1.0"/25mm) was generally above the long-term average for south-central West Virginia (Tables 10 and 11). This is consistent with trend toward more extreme rainfall events.

The winter was quite moist, though January only averaged approximately 92% of normal precipitation in Beckley, WV and 62% in Bluestone Lake, WV (Table 12). February ranked close to normal in the Central and Southern Climate Divisions in West Virginia. Monthly precipitation for March finished just above normal as the precipitation total in the Southern Climate Division was the 35th wettest since records began in 1895. The wettest period of the winter occurred during the first week of March (4-8) when many sections tallied more than 2.0 inches (50mm) of liquid equivalent. In fact, one of the wettest days of the year occurred on March 5th when 1.9 inches (48 mm) fell in the region (Table 9).

Spring 2008 was wetter than normal with none of the months tallying below average rainfall. A 10 day dry spell was noted during the middle of April. The most organized severe storms took place on June 16th as hail and high winds effected many parts of the region.

The summer brought below average rainfall despite a contribution from a tropical storm in September. Hannah caused heavy showers (~0.5 in/ 13 mm) on September 6. Despite this rainstorm, an 11 day dry spell occurred immediately following the storm's passage (Table 9).

The autumn was near normal due to a dry October and November counteracted by a very soggy December (Figure 8). October was quite dry with most sections averaging less than 60% of the normal rainfall. For example, Bluestone Lake, WV had less than 30% of normal rainfall with a monthly rainfall total of 0.8 inches (20 mm) (Tables 12 and 13). An early heavy wet snow fell on the higher elevations on November 18. A series of storms brought a wintry mixture to the region from December 10-24. Freezing rain glazed the higher elevations several times. December brought the most amount of liquid in more than half the region. Overall, 2008 ranked in the top third (around 35 of 114) of wet years for the area.

Gauley River NRA, Bluestone NSR, New River Gorge NR
Percent of Average Monthly Precipitation
2008 vs. 1971–2000

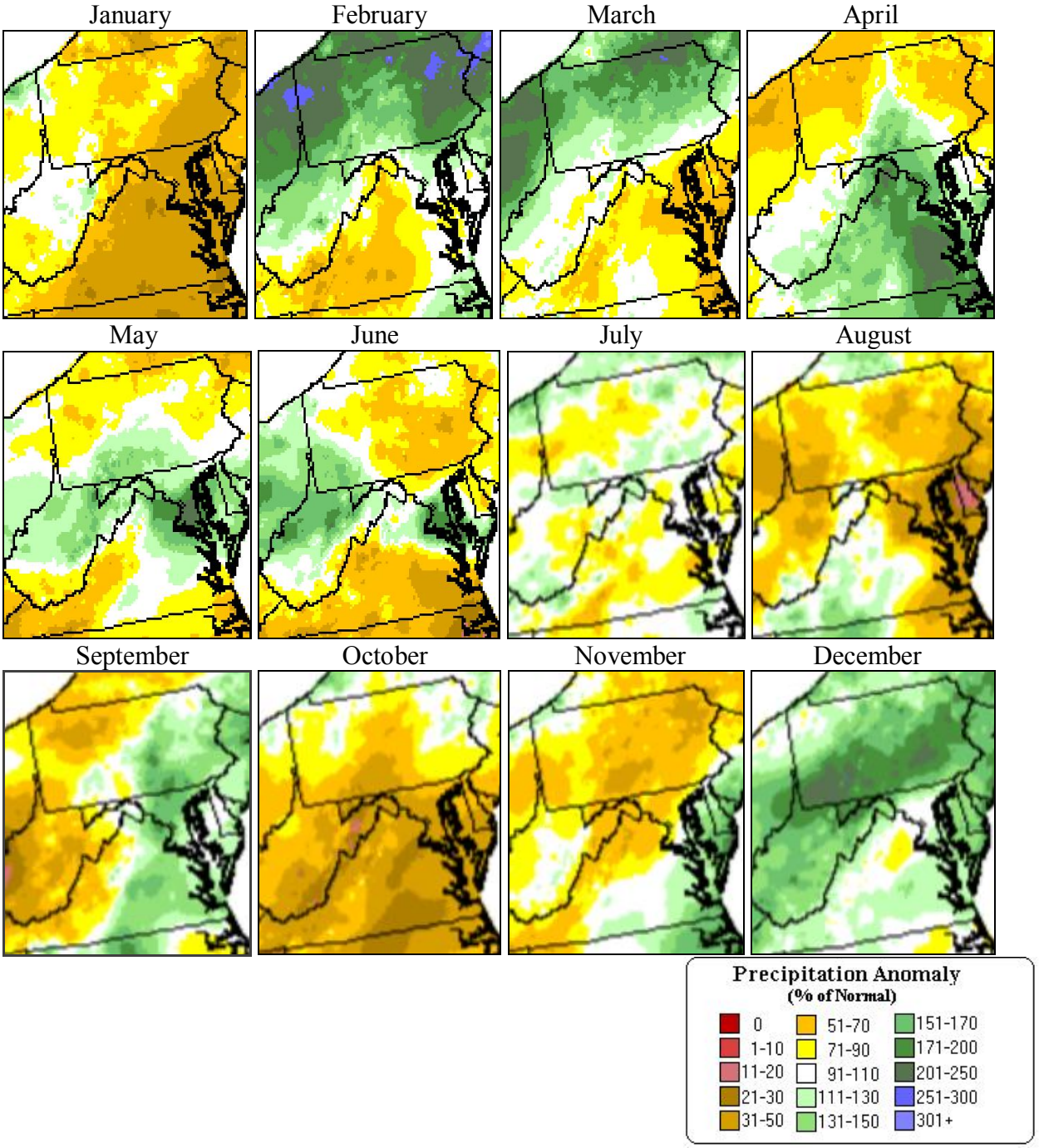

Figure 8. Maps showing percent of average precipitation for each month in the calendar year 2008 as compared with the normal based on the period 1971-2000. Departure values are reported in percent of normal. Maps were created using estimates from the Parameter-elevation Regressions on Independent Slopes Model (PRISM). PRISM uses an interpolation scheme for precipitation between actual observations and corrects these estimates for changes in topography across the region (Daly et al, 1994). More information can be found at: http://www.prism.oregonstate.edu/

Table 9. A comparison of wettest single calendar days during 2008 with the longest periods with a trace or less rainfall during the same year in Bluestone National Scenic River, New River Gorge National River, and Gauley River National Recreation Area. Data from the COOP weather stations at London Locks (LONW2), Beckley (BCKW2), and Princeton (PRIW2).

Wettest Days in 2008	Dry Spells in 2008
Aug. 14: 3.8 in (97 mm)	Sept. 16–26
Dec. 12: 2.1 in (53 mm)	Aug. 16–25
Mar. 5: 1.9 in (48 mm)	Oct. 29 – Nov. 7
Jun. 29: 1.6 in (41 mm)	Aug. 30 – Sept. 6
Jan. 11: 1.5 in (38 mm)	Oct. 10–16
Aug. 3: 1.4 in (36 mm)	Oct. 18–24
Apr. 6: 1.4 in (36 mm)	Jul. 15–21

Table 10. Precipitation indicators of the climate near Bluestone National Scenic River, New River Gorge National River, and Gauley River National Recreation Area using the FAA site at Beckley, WV and COOP site at Grandview, WV and comparing their 2008 data with the 30 year mean from Beckley, WV. While elevation does vary, trends in 2008 showed above average number of wet days.

2008 Statistics compared with 30-year means	Grandview, WV (GRNW2) 2008	Beckley, WV (KBKW) 2008	Beckley, WV (KBKW) 1971–2000
Annual Precipitation in inches (millimeters)	56.2 (1427)	42.6 (1082)	41.6 (1057)
Autumn (Oct, Nov, Dec) Precipitation in inches (millimeters)	10.2 (259)	6.9 (175)	-
Annual snowfall in inches (centimeters)	40 (102)	34 (86)	59 (150)
Micro-drought (number of strings of 7+ days without rain)	4	4	-
Number of days ≥2.5 cm (1.00 in) rain	12	9	6.8
Heavy Rain (number of days ≥5.1 cm (2.00 in) rain)	5	2	-
Number of days with ≥0.3 cm (0.1 in) snow	32	20	-
Number of days with ≥2.5 cm (1.0 in) snow	22	14	16.2

Table 11. Precipitation indicators of the climate near Bluestone National Scenic River, New River Gorge National River, and Gauley River National Recreation Area using the FAA site at Charleston, WV and comparing its 2008 data with the 30 year mean. While its elevation is lower, trends in 2008 showed a decrease in annual snowfall.

2008 Statistics compared with 30-year means	Charleston, WV (KCRW) 2008	Charleston, WV (KCRW) 1971–2000
Annual Precipitation in inches (millimeters)	45.3 (1151)	44.1 (1120)
Autumn (Oct, Nov, Dec) Precipitation in inches (millimeters)	7.7 (196)	-
Annual snowfall in inches (centimeters)	25 (64)	38 (97)
Micro-drought (number of strings of 7+ days without rain)	4	-
Number of days ≥2.5 cm (1.00 in) rain	6	8.1
Heavy Rain (number of days ≥5.1 cm (2.00 in) rain)	1	-
Number of days with ≥0.3 cm (0.1 in) snow	14	-
Number of days with ≥2.5 cm (1.0 in) snow	8	11.6

Table 12. Summary of 2008 percent of normal precipitation based on 30-year normal (1971–2000) for reporting sites around Bluestone National Scenic River, New River Gorge National River, and Gauley River National Recreation Area.

Station Location	ID	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Bluestone Lake, WV	BLUW2	62	62	119	139	75	87	106	148	69	30	95	160
Pineville, WV	PINW2	90	101	109	147	72	122	88	70	37	50	97	162
Summersville Lake, WV	SUMW2	63	88	105	114	121	91	113	113	79	13	93	155
London Locks, WV	LONW2	58	72	93	101	112	92	95	55	37	40	76	157
Gassaway, WV	GASW2	101	122	105	92	125	112	91	58	39	50	90	172
Hacker Valley, WV	HVAW2	102	128	107	96	136	111	102	52	48	62	95	153
Beckley, WV	BCKW2	92	85	156	134	84	109	136	221	45	33	89	156
Lewisburg, WV	LWBW2	90	87	85	114	83	107	115	74	91	23	65	151
Union, WV	UNIW2	66	53	68	128	78	89	107	108	39	21	66	144

Table 13. Summary of 2008 monthly total precipitation (in/mm) for reporting sites around Bluestone National Scenic River, New River Gorge National River, and Gauley River National Recreation Area.

Station Location	ID	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Bluestone Lake, WV	BLUW2	1.9 in	1.6 in	4.1 in	4.5 in	2.9 in	2.9 in	4.4 in	4.9 in	2.0 in	0.8 in	2.4 in	4.1 in	36.5 in
		48 mm	42 mm	104 mm	115 mm	75 mm	74 mm	113 mm	124 mm	50 mm	20 mm	61 mm	105 mm	904 mm
Pineville, WV	PINW2	3.5 in	3.3 in	4.3 in	5.7 in	3.6 in	4.9a in	4.4 in	2.7d in	1.3 in	1.5 in	3.1 in	5.6 in	44.0 in
		89 mm	84 mm	109 mm	146 mm	92 mm	125 mm	113 mm	69d mm	32 mm	39 mm	80 mm	142 mm	1118 mm
Summersville Lake, WV	SUMW2	2.3b in	2.7 in	4.1 in	4.3a in	5.8 in	4.0 in	6.3 in	5.3 in	2.8 in	0.4c in	3.1d in	5.4d in	46.5 in
		58b mm	68 mm	104 mm	110a mm	146 mm	103 mm	159 mm	135 mm	72 mm	11 mm	78d mm	138d mm	1181 mm
London Locks, WV	LONW2	2.0 in	2.1d in	3.5 in	3.7 in	5.4 in	3.9a in	4.8 in	2.3 in	1.3 in	1.0 in	2.7 in	5.5a in	38.2 in
		50 mm	54d mm	89 mm	94 mm	138 mm	98a mm	123 mm	58 mm	33 mm	26 mm	67 mm	139a mm	970 mm
Gassaway, WV	GASW2	3.6b in	4.0 in	4.5 in	3.5 in	5.7 in	5.3a in	4.9 in	2.8 in	1.5 in	1.5 in	3.5 in	6.6 in	47.2 in
		90b mm	101 mm	114 mm	88 mm	145mm	133a mm	126 mm	70 mm	38 mm	39 mm	90 mm	167 mm	1199 mm
Hacker Valley, WV	HVAW2	4.6 in	5.2 in	5.3 in	4.9 in	7.9 in	6.0 in	6.4 in	2.7 in	2.1 in	2.4 in	4.3 in	7.0 in	58.9 in
		117 mm	132 mm	134 mm	123 mm	20 mm	152 mm	164 mm	70 mm	54 mm	62 mm	109 mm	179 mm	1496 mm
Beckley, WV	BCKW2	2.9 in	2.3 in	4.9 in	4.5 in	3.5 in	3.8 in	6.2 in	7.8 in	1.4 in	0.8 in	2.5 in	4.5 in	45.2 in
		73 mm	58 mm	126 mm	115 mm	89 mm	96 mm	157 mm	20 mm	36 mm	21 mm	65 mm	115 mm	1148 mm
Lewisburg, WV	LWBW2	2.9 in	2.6 in	3.1 in	3.7 in	3.5 in	4.0 in	4.8 in	2.7 in	2.7 in	0.6 in	2.0 in	4.7 in	37.2 in
		73 mm	65 mm	78 mm	95 mm	89 mm	102 mm	122 mm	67 mm	68 mm	16 mm	51 mm	119 mm	945 mm
Union, WV	UNIW2	1.7 in	1.3 in	2.2 in	4.2 in	3.1 in	3.0 in	3.9 in	3.4 in	1.2 in	0.5 in	1.7 in	3.3 in	29.4 in
		43 mm	33 mm	55 mm	106 mm	79 mm	76 mm	99 mm	86 mm	31 mm	14 mm	43 mm	84 mm	746 mm

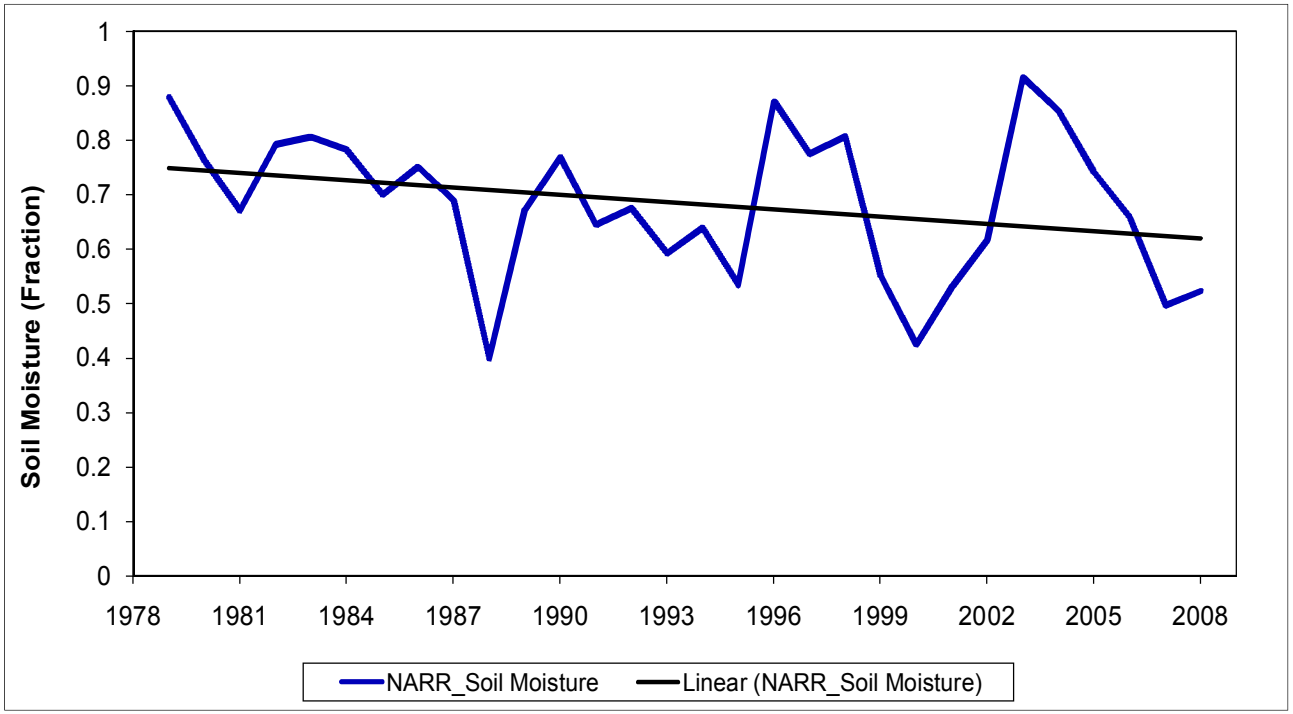

Figure 9. Annual soil moisture trends for Bluestone National Scenic River, New River Gorge National River, and Gauley River National Recreation Area as seen from the North American Regional Reanalysis data set. The black line is the soil moisture trend for a 32-km square box centered around the parks as derived from the North American Regional Reanalysis (NARR). There has been a slow decline in the soil moisture content during the last 30 years.

Stream Flow for 2008

The USGS maintains river level and flow monitoring gauges along the Gauley River, New River, and Bluestone Lake. There is a response time between rainfall, snow-melt and changes in the river conditions as well as major influences of reservoir releases. There is also seasonality to the river flow with peak flows typically occurring in the spring and minimum flow being measured in the autumn (Groisman et al, 2000). However, increases in precipitation amount and intensity during the past several decades have overridden some of this seasonality. Two gauges were selected to profile river level and flow during the calendar year 2008 and these are displayed in Figures 10-11.

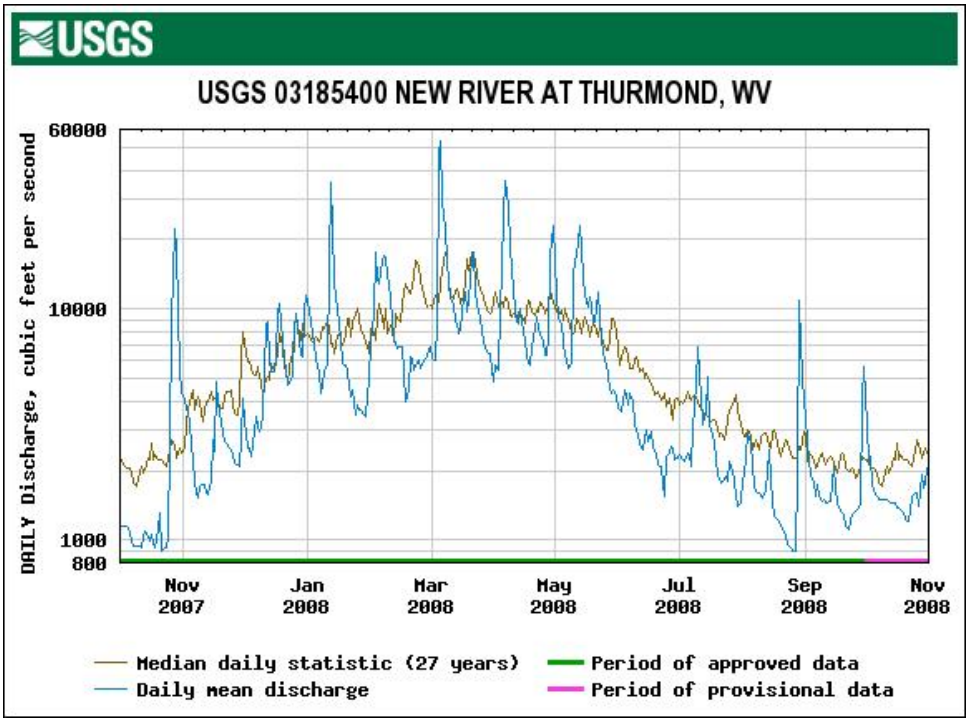

Figure 10. The flow of the New River at Thurmond show the significant impact of a dry period during the late summer and parts of the early autumn.

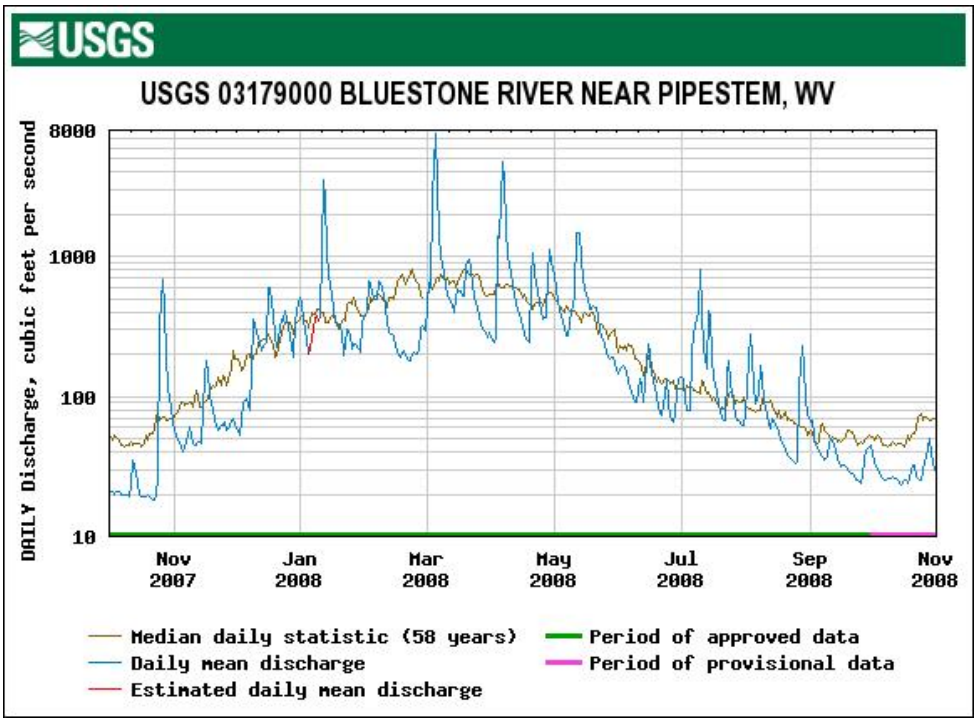

Figure 11: The flow of the Bluestone River near Pipestem indicates near average flow until September when dry conditions dominated.

Drought Status

The US Drought Monitor (USDM; http://www.drought.unl.edu/dm/monitor.html) tracks drought conditions across the nation on a weekly basis, and it incorporates data and expert input from a wide variety of state and federal agencies (NIDIS, 2008). The USDM is designed to represent a "broad brush", regional perspective on drought, and therefore provides an ideal tool for tracking generalized drought conditions across the West Virginia parks and surrounding areas. According to the USDM by the end of July 2008, the Palmer Drought Severity Index (PDSI) began a rapid drop from abnormally moist (~0.8) to abnormally dry (~ -1.5) by late October (Figures 12-14). However, a wetter December brought conditions back to normal. When compared with the past few years, the dry late summer and autumn of 2008 was akin to 2007, though this past year had more showers in September through November. Since the PDSI responds to long-term effects including evaporation, there is usually a lag between both long dry spells and episodes of heavy rain and changes in the index value.

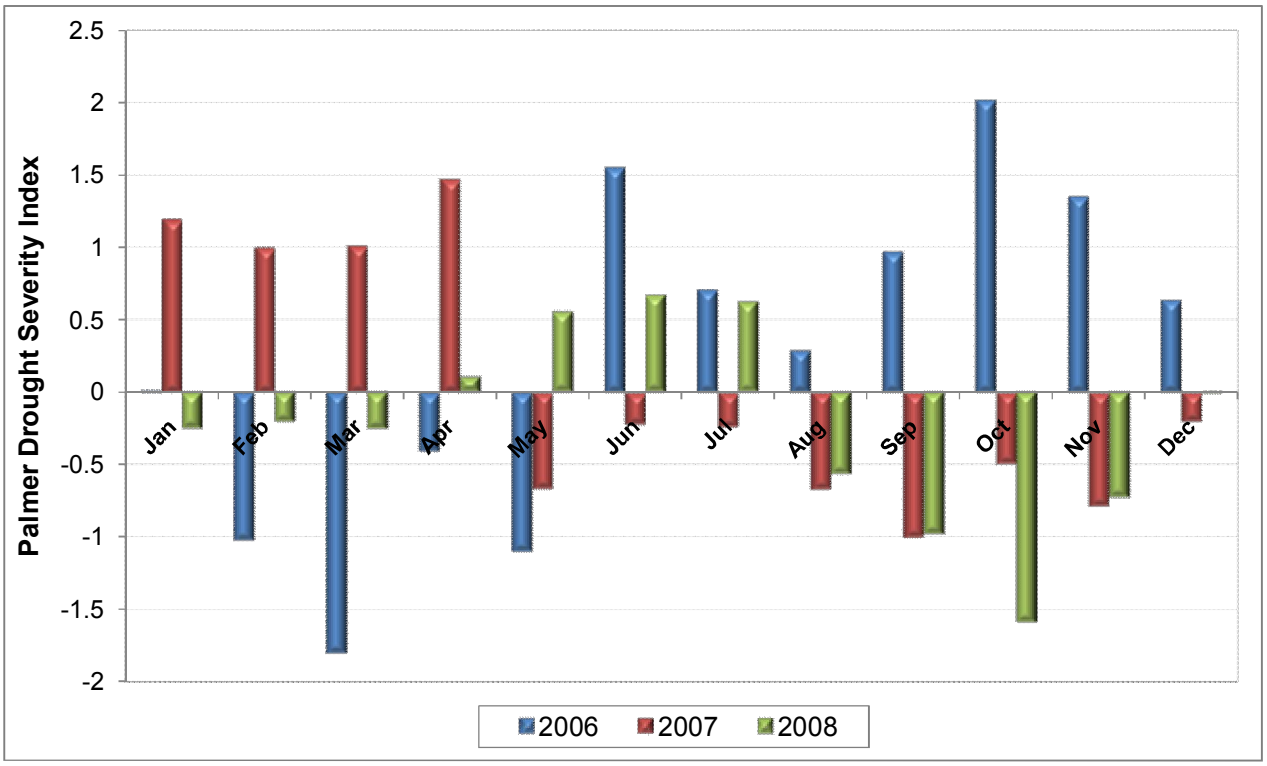

Figure 12. A comparison of the Palmer Drought Severity Index (PDSI) for the West Virginia Climate Divisions 4 and 5, which encompass most of Bluestone National Scenic River, New River Gorge National River, and Gauley River National Recreation Area. The PDSI during 2008 began below normal (dry) in January and switched to above normal (moist) by the end of April. The wet spell did not last long as the PDSI returned to below normal in August.

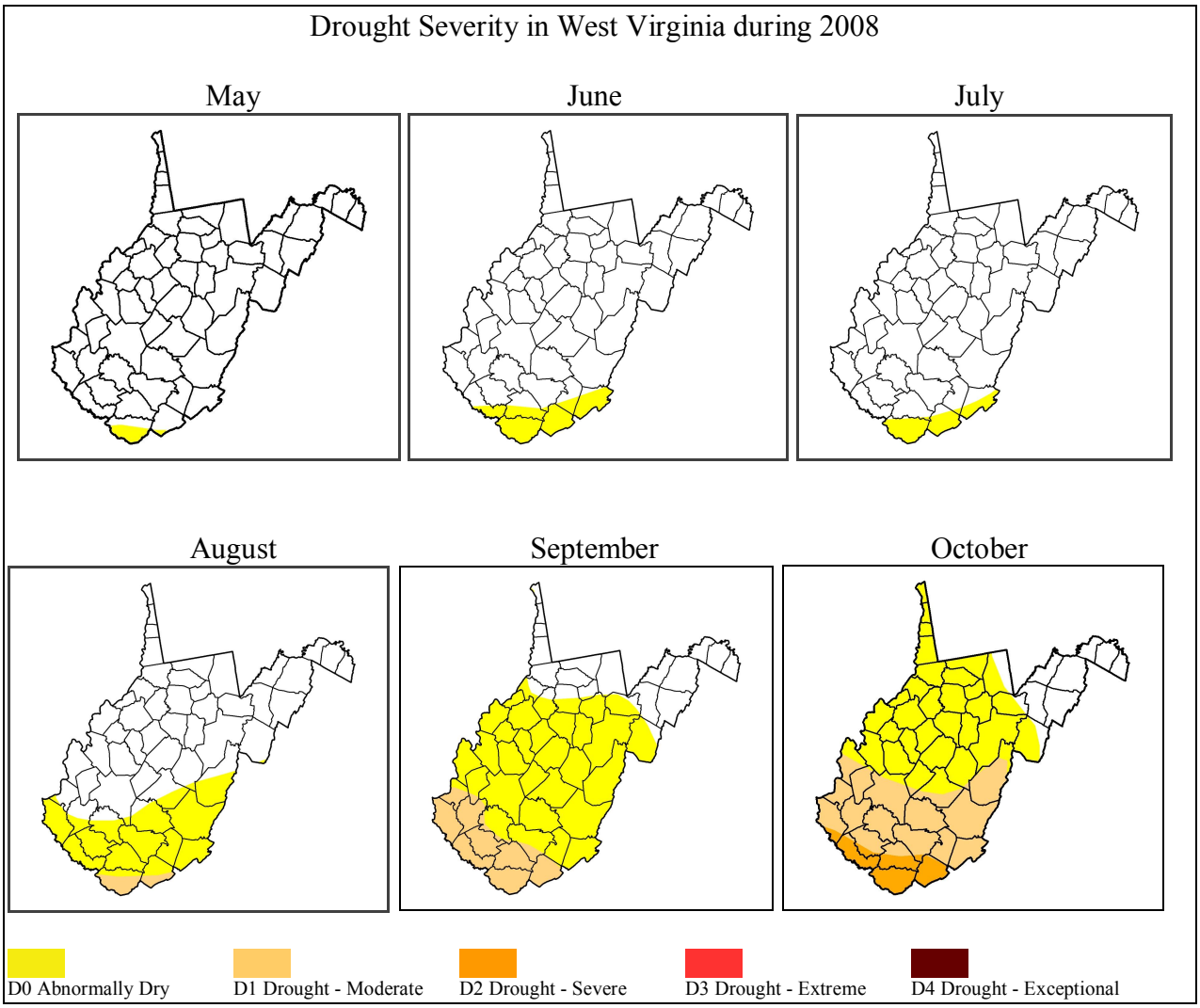

Figure 13. The mid-month values of the PDSI for West Virginia showing that dry conditions encroached on the West Virginia Parks during 2008 and by October, some sections were nearing severe drought status.

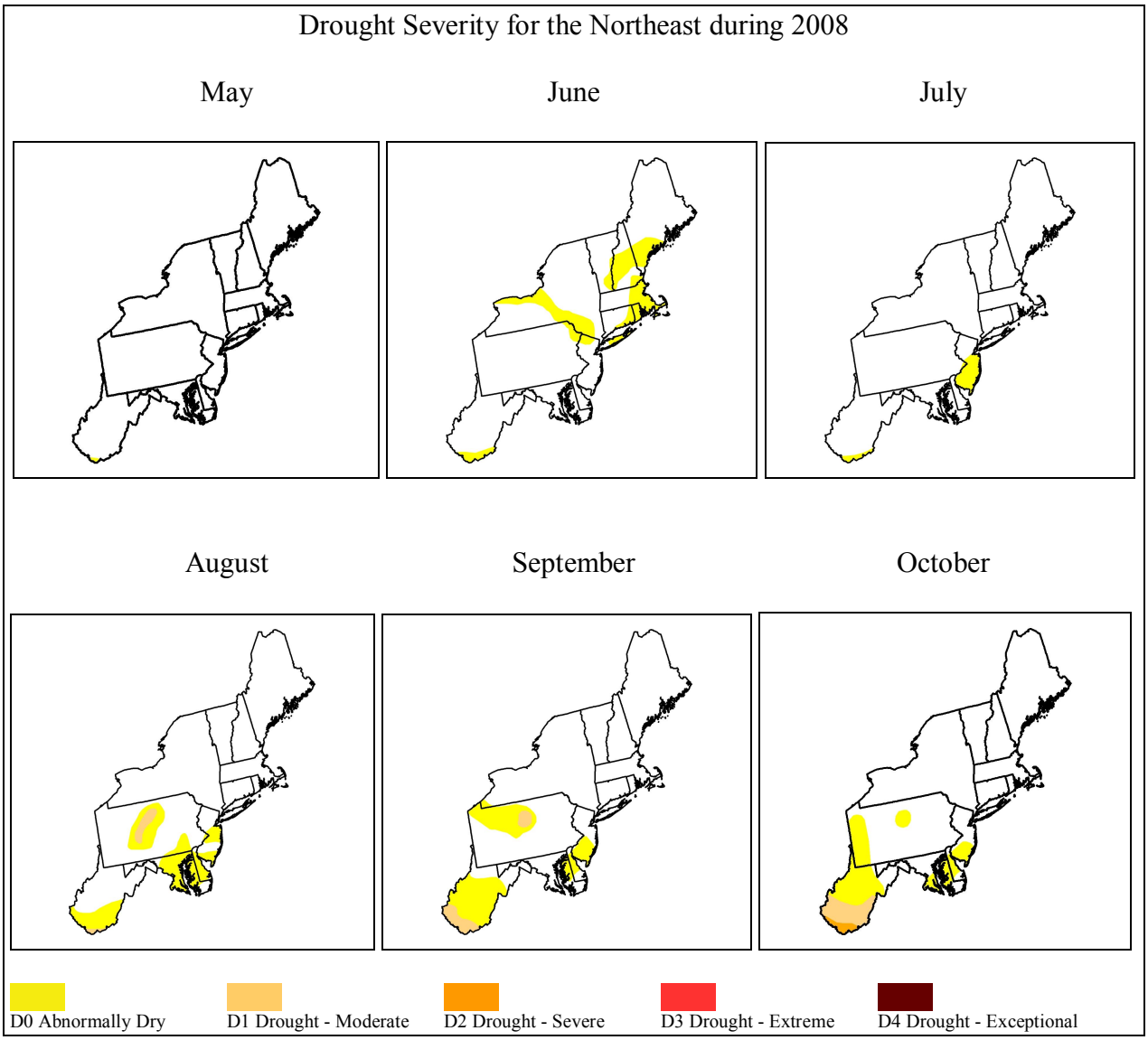

Figure 14. The mid-month values of the PDSI for the Northeast during the 2008 warm season. The southern part of West Virginia was the most consistently dry region.

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Appendix.

The following tables are a tally of all reports of severe weather during 2008 in the counties that encompass GARI, NERI and BLUE. These storm events were provided by the National Climatic Data Center (NCDC). NCDC receives this storm data from the National Weather Service, who acquires their information from a variety of sources. These sources include but are not limited to: county, state, and federal emergency management officials, local law enforcement officials, skywarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry, and the general public. This Storm Data is an official publication of the National Oceanic and Atmospheric Administration (NOAA) which documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. Each table contains the location, date, time, description of the severe event, its magnitude, and number of deaths, injuries, and property/crop damage associated with the event. The property and crop damage should be considered as a broad estimate.

Summers County

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
WVZ043 - 044	1/17/2008	5:30 AM	Winter Storm	N/A	0	0	0K	0K
WVZ043	2/10/2008	13:30 PM	High Wind	52 kts.	0	0	10K	0K
Nimitz	5/11/2008	12:00 PM	Thunderstorm Wind	55 kts.	0	0	1K	0K
Pipestem	5/11/2008	15:30 PM	Hail	1.75 in.	0	0	0K	0K
Pipestem	5/11/2008	15:30 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
Judson	6/1/2008	17:05 PM	Hail	1.00 in.	0	0	0K	0K
Ballengee	6/1/2008	17:20 PM	Thunderstorm Wind	50 kts.	0	0	1K	0K
Jumping Branch	6/16/2008	20:48 PM	Hail	0.88 in.	0	0	0K	0K
Pipestem	7/8/2008	15:49 PM	Thunderstorm Wind	60 kts.	0	0	10K	0K
Green Sulphur Spgs	7/22/2008	19:41 PM	Thunderstorm Wind	50 kts.	0	0	1K	0K
Bellepoint	12/11/2008	17:00 PM	Flash Flood	N/A	0	0	2K	0K
				Totals:	**0**	**0**	**25K**	**0**

Mag:	Magnitude
Dth:	Deaths
Inj:	Injuries
PrD:	Property Damage
CrD:	Crop Damage

Mercer County

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
WVZ042 - 045	1/1/2008	17:00 PM	Heavy Snow	N/A	0	0	0K	0K
WVZ042	1/17/2008	5:00 AM	Winter Storm	N/A	0	0	0K	0K
WVZ042	2/10/2008	16:00 PM	High Wind	52 kts.	0	0	5K	0K
WVZ042 - 045	2/26/2008	21:00 PM	Heavy Snow	N/A	0	0	0K	0K
Spanishburg	3/4/2008	19:00 PM	Thunderstorm Wind	50 kts.	0	0	1K	0K
Bramwell	3/4/2008	20:45 PM	Flash Flood	N/A	0	0	750K	0K
Athens	5/11/2008	12:02 PM	Hail	0.75 in.	0	0	0K	0K
Lashmeet	5/11/2008	15:05 PM	Hail	1.00 in.	0	0	0K	0K
Matoaka	5/11/2008	15:15 PM	Hail	0.75 in.	0	0	0K	0K
Bluefield	5/18/2008	23:27 PM	Hail	0.75 in.	0	0	0K	0K
Flat Top	6/10/2008	13:56 PM	Hail	1.75 in.	0	0	0K	0K
Princeton	6/10/2008	17:30 PM	Hail	0.88 in.	0	0	0K	0K
Mc Comas	6/16/2008	15:35 PM	Hail	1.00 in.	0	0	0K	0K
Crystal	6/16/2008	15:36 PM	Thunderstorm Wind	50 kts.	0	0	2K	0K
Giatto	6/16/2008	15:36 PM	Hail	1.25 in.	0	0	0K	0K
Ceres	6/16/2008	15:45 PM	Hail	1.00 in.	0	0	1K	0K
Glenwood	6/16/2008	15:55 PM	Hail	0.88 in.	0	0	0K	0K
Oney Gap	6/16/2008	15:58 PM	Hail	0.75 in.	0	0	0K	0K
Hales Gap	6/22/2008	13:55 PM	Hail	0.75 in.	0	0	0K	0K
Bluefield	6/22/2008	18:23 PM	Hail	1.00 in.	0	0	0K	0K
Stengle	7/6/2008	16:30 PM	Flash Flood	N/A	0	0	100K	0K
Matoaka	7/22/2008	18:59 PM	Thunderstorm Wind	50 kts.	0	0	1K	0K
Athens	7/22/2008	19:24 PM	Thunderstorm Wind	50 kts.	0	0	1K	0K
Hiawatha	7/23/2008	13:11 PM	Thunderstorm Wind	55 kts.	0	0	4K	0K
Oakvale	7/23/2008	13:33 PM	Thunderstorm Wind	50 kts.	0	0	1K	0K
Princeton	7/23/2008	13:33 PM	Thunderstorm Wind	50 kts.	0	0	1K	0K
Athens	7/23/2008	13:42 PM	Thunderstorm Wind	50 kts.	0	0	1K	0K
Princeton	8/2/2008	12:22 PM	Hail	0.88 in.	0	0	0K	0K
Princeton	8/2/2008	12:25 PM	Hail	0.75 in.	0	0	0K	0K
WVZ042	10/14/2008	7:00 AM	Drought	N/A	0	0	0K	0K
WVZ042	11/1/2008	12:00 AM	Drought	N/A	0	0	0K	0K
WVZ042	11/17/2008	14:45 PM	Heavy Snow	N/A	0	0	0K	0K
WVZ042	12/1/2008	12:00 AM	Drought	N/A	0	0	0K	0K
WVZ042	12/19/2008	14:05 PM	High Wind	50 kts.	0	0	1K	0K
				Totals:	**0**	**0**	**868K**	**0**

Raleigh County

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
WVZ009 - 031 - 035 - 047	2/10/2008	12:15 AM	High Wind	52 kts.	0	0	10K	0K
WVZ009 - 031 - 035 - 047	2/10/2008	12:15 AM	Strong Wind	48 kts.	0	0	5K	0K
WVZ033>038 - 046	2/26/2008	21:00 PM	Heavy Snow	N/A	0	0	0K	0K
WVZ033>038 - 046	2/26/2008	21:00 PM	Winter Weather	N/A	0	0	0K	0K
Prosperity	4/11/2008	17:00 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
Glen Daniel	4/19/2008	16:30 PM	Hail	1.00 in.	0	0	0K	0K
Bradley	4/19/2008	16:35 PM	Hail	1.00 in.	0	0	0K	0K
Colcord	6/16/2008	18:20 PM	Hail	0.75 in.	0	0	0K	0K
Rock Creek	6/16/2008	20:20 PM	Hail	0.88 in.	0	0	0K	0K
Beckley	6/16/2008	20:34 PM	Hail	1.00 in.	0	0	0K	0K
Daniels	6/16/2008	20:49 PM	Hail	0.75 in.	0	0	0K	0K
Beckley	6/22/2008	16:05 PM	Hail	1.00 in.	0	0	0K	0K
Stickney	7/22/2008	19:15 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
Price Hill	8/2/2008	13:45 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
Table Rock	8/13/2008	15:18 PM	Hail	0.75 in.	0	0	0K	0K
(bkw)raleigh Co Arpt	8/13/2008	15:30 PM	Hail	1.25 in.	0	0	0K	0K
Beaver	8/13/2008	15:30 PM	Hail	0.88 in.	0	0	0K	0K
Beaver	8/13/2008	15:50 PM	Hail	1.00 in.	0	0	0K	0K
Beckley	8/13/2008	15:50 PM	Hail	0.75 in.	0	0	0K	0K
Surveyor	8/13/2008	16:24 PM	Hail	0.75 in.	0	0	0K	0K
Grandview	8/13/2008	16:30 PM	Flash Flood	N/A	0	0	50K	0K
Mabscott	8/13/2008	16:47 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
Glen Daniel	8/13/2008	16:56 PM	Hail	0.75 in.	0	0	0K	0K
Tams	9/9/2008	1:35 AM	Thunderstorm Wind	50 kts.	0	0	0K	0K
				Totals:	**0**	**0**	**65K**	**0**

Nicholas County

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
WVZ037>040	1/1/2008	16:00 PM	Heavy Snow	N/A	0	0	0K	0K
Craigsville	2/6/2008	4:30 AM	Thunderstorm Wind	50 kts.	0	0	0K	0K
WVZ007>011 - 016>020 - 027>032 - 037>040 - 046	2/20/2008	7:00 AM	Winter Weather	N/A	0	0	0K	0K
WVZ033>038 - 046	2/26/2008	21:00 PM	Heavy Snow	N/A	0	0	0K	0K
WVZ033>038 - 046	2/26/2008	21:00 PM	Winter Weather	N/A	0	0	0K	0K
Summersville	4/11/2008	17:30 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
Nettie	4/11/2008	17:40 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
Carl	6/4/2008	16:15 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
Muddlety	6/22/2008	14:46 PM	Hail	2.00 in.	0	0	10K	0K
Hookersville	6/22/2008	14:55 PM	Hail	2.00 in.	0	0	15K	0K
Richwood	6/22/2008	15:30 PM	Hail	0.75 in.	0	0	0K	0K
Nettie	7/7/2008	16:25 PM	Hail	0.75 in.	0	0	2K	0K
Nettie	7/7/2008	16:25 PM	Hail	1.75 in.	0	0	2K	0K
Birch River	7/20/2008	20:11 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
WVZ036>039 - 046	11/17/2008	15:00 PM	Heavy Snow	N/A	0	0	0K	0K
				TOTALS:	**0**	**0**	**29K**	**0**

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NPS XXXXXX, February 2010

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